

SOME LAELAPID MITES OF SYNDACTYLOUS MARSUPIALS

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[Read 30th June 1965]

Synopsis

Australolaelaps greeni, n. sp. is described from the peculiarly Tasmanian *Bettongia cuniculus* (Potoroinae, Macropodidae), and *Haemolaelaps calypso*, n. sp. from *Petaurus breviceps* (Phalangerinae, Phalangeridae), which occurs throughout eastern Australia and New Guinea. The comparative anatomy of the species of *Trichosurolaelaps* and *Australolaelaps* is tabulated, all being parasites of recent syndactylous marsupials in the Australian zoogeographical region. Both genera are recognized as valid. The former comprises two species-groups, one from peramelids and one from phalangerids and *Hypsiprymnodon*, the sole member of an aberrant macropodid subfamily with traces of its scansorial ancestry. The latter comprises parasites of the remaining macropodid subfamilies (Potoroinae and Macropodinae).

Among the mite parasites of the peculiarly Australian syndactylous marsupials is a small group of laelapids with heavily armed coxae and edentate chelicerae. Through the courtesy of Mr. J. H. Calaby, Division of Wildlife Research, C.S.I.R.O., Canberra, I recently received a new species of this, perhaps the most characteristic of all the Australian laelapid groups. As there has been some uncertainty about the natural grouping of these mites, the description of the new species (genus *Australolaelaps*) seems worthwhile. The opportunity is also taken to tabulate the comparative anatomy of all ten species involved, and to suggest a natural classification based both on morphology and ecology.

A new species of the *ulysses* species-group, genus *Haemolaelaps* Berlese, is also described.

AUSTRALOLAELAPS GREENI, n. sp.

(Figs 1-6)

Diagnosis: Within the genus *Australolaelaps*, *A. greeni*, possessing an immense hook on coxa II and elongate peritremes, is much closer morphologically to the new combination *A. validipes* (Domrow)* than to *A. mitchelli* Womersley. This is confirmed by ecological data. *A. greeni* and *A. validipes* parasitize potoroines, while all known hosts of *A. mitchelli* are macropodines. From Table 1 below, the two species from rat-kangaroos may be separated, in both sexes, by the number of setae on the dorsal shield and, in the female, by the number of usurped ventral setae on the genitoventral shield.

* The original assignment of this species to *Echinonyssus* Hirst (1925) was based solely on coxa II, but it now seems that the hook on this segment has evolved separately in the two groups. It should also be pointed out that *Hirstionyssus* da Fonseca (1948) is a synonym of *Echinonyssus*, whose type species (*E. nasutus* Hirst, a common parasite of Malaysian primates—or insectivores according to some authorities—of the genus *Tupaia*, Tupaiidae) is only one step removed (hook on coxa II stronger, vertex extended) from *E. callosciuri* and other species with incipient hooks on coxa II recently described from Eurasian rodents and insectivores (see Willmann, 1952: Delfinado, 1960; Bregetova and Grokhovskaya, 1961; and Wang, 1962). *Echinonyssus* has not crossed Wallace's line to the east—*E. musculi* (Johnston), a cosmopolitan parasite of the introduced house mouse, is, however, now present in Australia (Domrow, 1961, 1963)—and, apart from zoogeographical considerations, may be separated (i) from *Trichosurolaelaps* by the absence of (a) an armed tritosternal base, and/or (b) usurped ventral setae on the genital shield, and (ii) from *Australolaelaps* by the absence of (a) usurped ventrals in the female, and (b) modifications to femur and tarsus II in the male.

Types: Holotype female, allotype male, 13 paratype females, four paratype males and two morphotype deutonymphs from the Tasmanian rat-kangaroo, *Bettongia cuniculus* (Ogilby) (Potoroinae, Macropodidae, Marsupialia), Green's Beach, Tasmania, 6.iv.1964, R. H. Green *leg.* The holotype, allotype and one pair of paratypes have been lodged in the Australian National Insect Collection, C.S.I.R.O., Canberra.

Female: Idiosomal length in mounted, only slightly compressed specimens always within circumscribed limits 440–473, av. 454 μ . Dorsal shield textureless, about twice as long as wide, slightly concave vertically and midlaterally, semicircular in posterior quarter. Margin, though somewhat eroded, distinct vertically and laterally, leaving some setae from shield series free in adjacent cuticle. Shield with 33 pairs of setae, those on posterolateral margins somewhat stronger, and one subterminal pair minute; also with few paired pores in anterior half. Dorsal marginal cuticle with six to eight pairs of setae with rather stronger shafts than those on shield. Stigmata dorsolaterally located, with short peritremes showing two parallel series of net-like markings; peritremal shields extending forward from tip of peritremes, with eight-shaped sclerotization evident on focussing more deeply.

Venter. Sternal shield extensive, but textureless, broadly arched and very weakly defined anteriorly; posterior margin not identified. Six sternal setae and four spot-like sternal pores present. Metasternal complex represented only by obsolescent shieldlets and adjacent setae. Genital shield broad, truncate posteriorly, textureless except for two weak areolations (muscle insertions); marginal strip less heavily sclerotized than disc of shield; with two genital setae, two pores and four usurped ventral setae. Genital operculum strongly rayed, encroaching broadly onto sternal area; supported by two weakly sclerotized apodemes between coxae IV. Anal shield large, twice as long as wide, of all body shields the most heavily sclerotized; minutely granulate discally and heavily sclerotized laterally, with weak longitudinal striae; cribrum present. Anus set well forward, with adanal setae slightly behind its centre; postanal seta centrally placed, slightly weaker than adanals. Only merest indications of metapodal shields. Ventral body cuticle with about ten pairs of setae, of which some posterolateral pairs are decidedly stronger than remainder.

Legs. Coxal setal formula 2.1.2.1, anterior seta on coxa II obliterated by hypertrophy of process on anterodorsal margin, which forms immense, ventrally directed hook, with minute striate ridges basally. Formulae for remaining segments: trochanters 6.5.5.5; femora 13.11.6.6; genua 13.11.9.9; tibiae 13.10.8.10; tarsi -16.16.16 (this parallels Till's 1963 formulae for *Androtaelaps* Berlese, including *Haemolaelaps* Berlese, except for genu IV, which in *A. greeni* has one fewer setae). Coxa I with rather sharp, backwardly directed process on anterobasal angle; I-IV with somewhat blunter excrescence on posterior aspect. Anteroventral margin of coxa IV spinulose. Femora I and II with basally directed setigerous spur dorsally; femur IV with somewhat similar, but asetose, elevation. All tarsi rather irregular in outline, especially on posterior face. All leg setae slenderly tapering, two or three on posterior aspect of tarsi II and III being somewhat expanded and hyaline basally. Tarsus I with dorsodistal sensory zone, including one distinctly bent rod. Pulvilli I with shorter stalk and weaker claws than II-IV.

Gnathosomal and inner posterior hypostomal setae subequal, much stronger than outer posterior and anterior hypostomals. Labial cornicles ill-defined. Deutosternum with about five denticulations mostly in double file. Tritosternum with very weakly barbed base and laciniae. Palpi with five free segments; setal formula (trochanter to genu) 2.4.6; tibia probably with 11 setae, including two dorsodistal rods; tarsus with bifurcate claw and several setae, one of which is quite long. Chelicerae with basal segment short, and distal segment slenderly tapering; digits elongate, weak and edentate; corona absent.

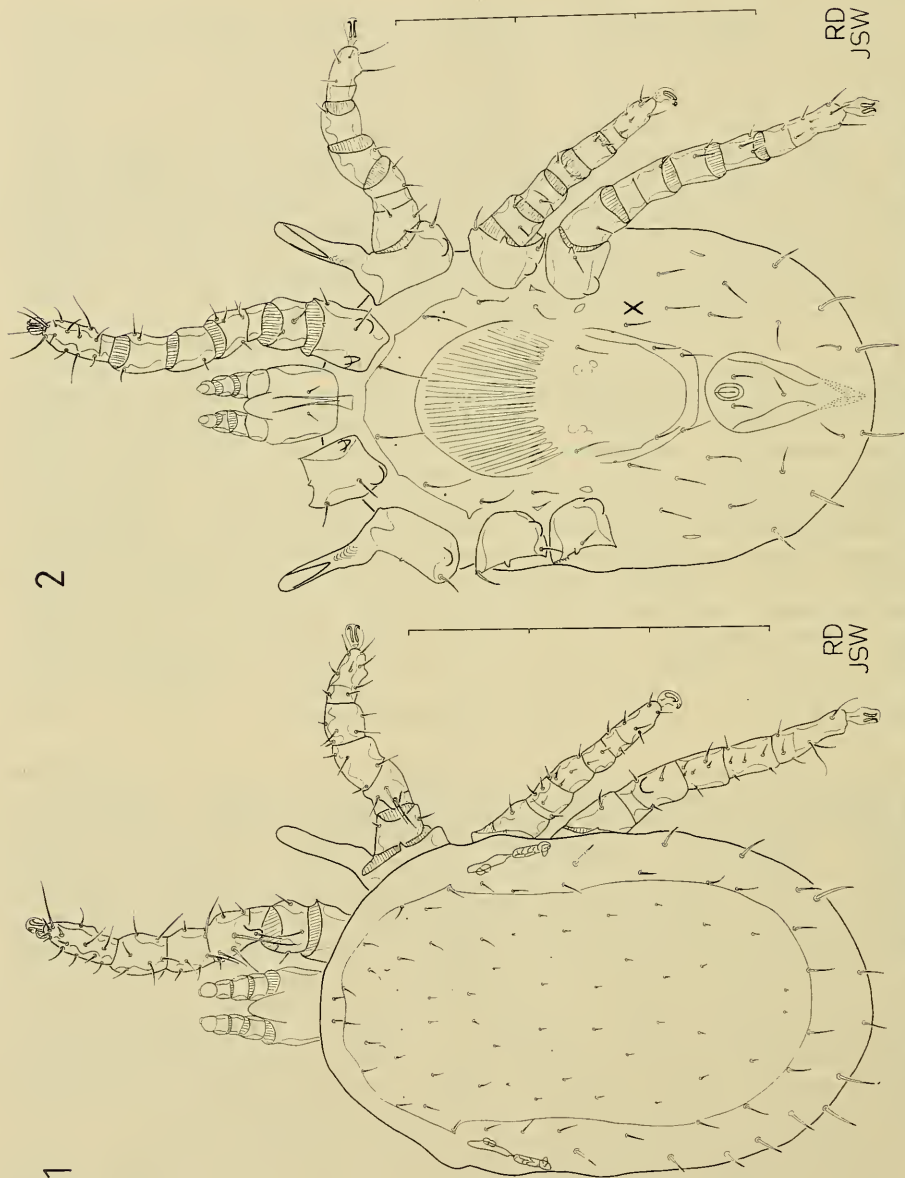


Fig. 1. *Australolaelaps greenii*, n. sp.—Dorsum ♀. (Each division on the scales equals 100 μ .)
Fig. 2. *Australolaelaps greenii*, n. sp.—Venter ♀.

Male: Idiosomal length more variable than in female; three specimens 418-429 and two 341 and 352 μ , all carefully mounted. Dorsal shield more evenly ovate than in female, slightly wider at humeral level; with all setae (33 pairs) set on shield and rather stronger than in female. Remainder of dorsum essentially as in female.

Venter. Sternogenitoventral shield produced anteriorly between coxae I, widest between coxae II and III and truncate behind coxae IV. Sternometasternal area with eight setae and four pores as in female. Genitoventral area with indications of more weakly sclerotized margins, two genital setae and six usurped ventral setae (i.e., pair of ventrals marked "X" near genitoventral shield of female actually taken onto shield in male). Genital aperture well in front of SI; internal duct elongate, leading back to between SII and III. Anal shield discrete, as in female. Ventral body cuticle with only six or seven pairs of subequal setae.

Legs larger in respect to idiosoma than in female. Coxal setal formula 2.2.2.1, coxa II with well developed pointed process on anterodorsal margin, but anterior seta normally developed. Coxa I with weak process and II and III with slight excrescence on posterior aspect. Coxa IV spinulose on anteroventral margin. Setigerous spurs on femora I and II incipient and femur IV unarmed above; femur II with strongly modified, flask-like seta on posteroventral aspect. Three distal segments of legs II each with one short seta posteroventrally with base strongly inflated. Tarsus II produced into strong spur ventrodistally, causing pulvillus to appear subterminal. Leg setation otherwise as in female, but somewhat stronger. Ambulacra as in female.

Gnathosoma essentially as in female, but chelicerae with movable digit coalesced with seemingly tubular spermatophore-carrier.

Deutonymph: Neither specimen is badly compressed. The smaller (idiosoma 412 μ long) is, to judge from coxa II, prefemale; the larger (440 μ) contains male so well developed that double setation hinders examination. Dorsally, including peritremes, as in male, with same 33 pairs of shield setae, although shield is even more reduced, at least in anterior half (see dotted line), than in female (seta marked "Y" is also off shield in premale).

Intercoxal shield elongate, with usual five pairs of setae. Anal shield as in adult.

Armature of coxae as in male, except for coxa II of prefemale, which bears both incipient hook and weak process on anterodorsal margin, but no anterior seta. Legs, apart from weakly developed setigerous spurs on femora I and II, unarmed and with setal formulae, including genu IV, as in adult. Sensory zone and ambulacra as in adult, but pulvilli I less sessile.

Gnathosoma, including chelicerae, as in female.

Notes: The syndactylous marsupials are confined entirely to the Australian zoogeographical region. They are absent from New Zealand (apart from the introduced *Trichosurus vulpecula*), but one genus, *Phalanger*, extends as far west as Sulawesi (Celebes). None have crossed Wallace's Line to the west (Darlington, 1957). Three distinct superfamilies are involved, the Dasyuroidea, Perameloidea and Phalangeroidea, but their phylogenetic relationships remain obscure (Simpson, 1945).

Two major dichotomies are in common use in marsupial classification. Using the condition of the incisor teeth, they may be divided into Polyprotodontia and Diprotodontia; using the condition of the second and third toes on the hind foot, they may be divided into the Didactyla and Syndactyla. However, as Simpson (1945) points out, "as might be expected of classifications based essentially on single characters, these are contradictory and unsatisfactory." Using the former, and confining ourselves to the Australian zoogeographical region, the Dasyuroidea and Perameloidea are polyprotodont,

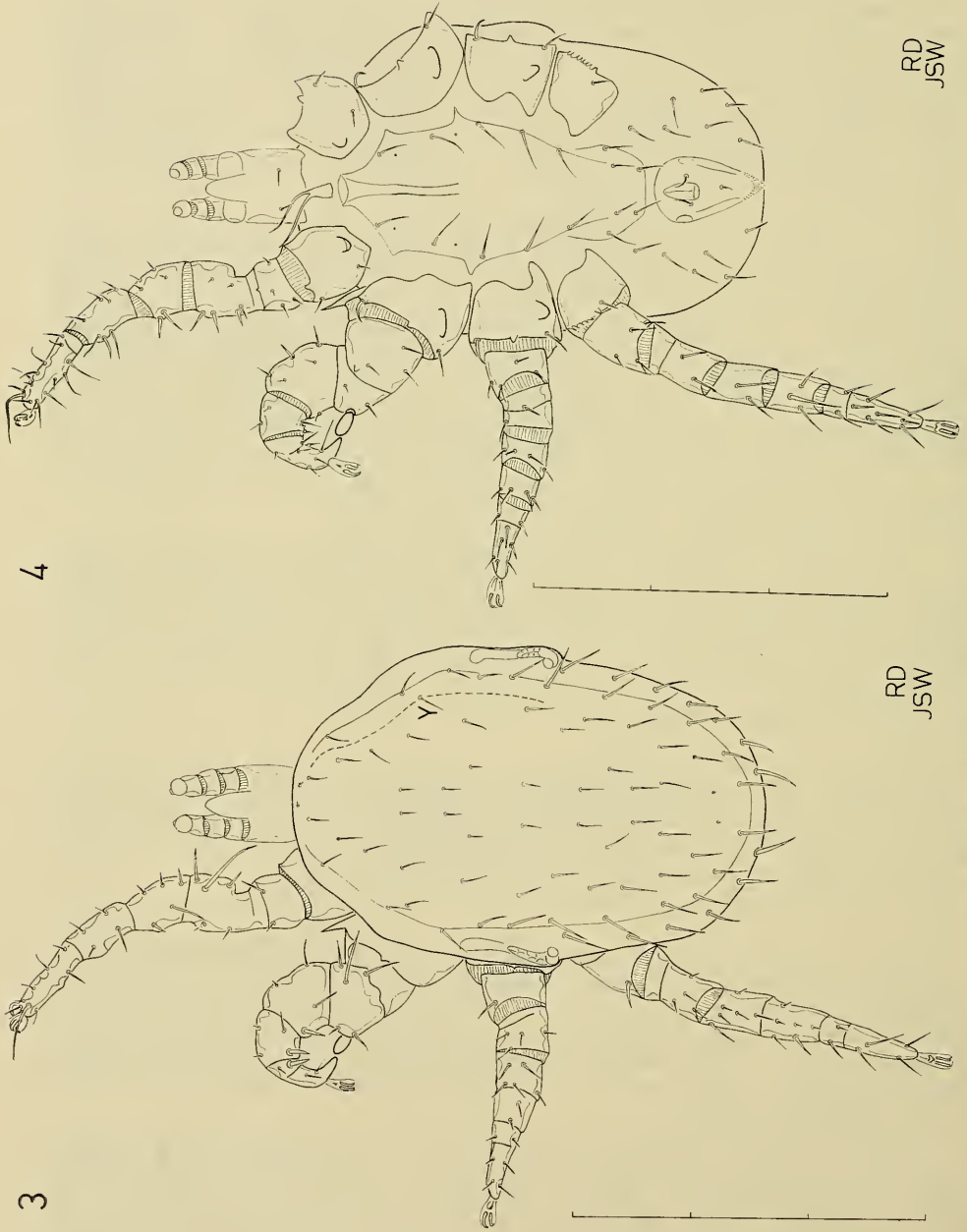


Fig. 3. *Australolaelaps greeni*, n. sp.—Dorsum ♂.
Fig. 4. *Australolaelaps greeni*, n. sp.—Venter ♂.

and the Phalangeroidea diprotodont; using the latter, the Dasyuroidea are didactylous, and the Perameloidea and Phalangeroidea syndactylous.

The problem is, therefore, should the perameloids, comprising the one (and only) syndactylous polyprotodont family Peramelidae, be associated with the dasyuroids on dentition, ignoring toe structure, or, vice versa, with the phalangeroids? The latter choice would seem to be indicated by the host-parasite relationships within the *emanuelae* species-group, genus *Trichosurolaelaps*, discussed below.*

A somewhat similar uncertainty surrounds the classification of the Phalangeroidea, which are all syndactylous diprotodonts, comprising the three families Phalangeridae, Macropodidae and the aberrant Phascolomidae (as only one mesostigmatic mite has been described from wombats, *Railletia australis* Domrow (1961), this last family may be excluded from further discussion). The anatomy and phylogeny of the macropodids have been reviewed in detail by Tate (1948). They are usually considered to be descendants of remote ancestors of modern phalangerids, but it is difficult to indicate any one division of the latter that could have given rise to any of the macropodid subfamilies, all of which possess varied combinations of primitive and specialized characters. Excluding two extinct groups, the macropodids may be treated in the order Hysiprymnodontinae, Potoroinae and Macropodinae.

The aberrant *Hysiprymnodon*, its feet "already profoundly modified for leaping" and therefore macropodid in *habitus*, is, in fact, little removed in certain characters from the phalangerids—it "alone of all recent macropodid genera retains the big toe", and friction ridges, typical of scansorial animals, are still present on its feet (Tate, 1948). It is not unexpected, therefore, that the mite species peculiar to it is inseparable, even at species-group level, from the parasites of phalangerids, and forms, with them, the *crassipes* species-group, genus *Trichosurolaelaps*. The parasites of the remaining, and more typical macropodid subfamilies, confirm the generally sharp division between the phalangerids and macropodids—they form a distinct genus, *Australolaelaps*.

I am most grateful to Mr. Calaby for reviewing the preceding paragraphs of these notes, and for pointing out to me Ride's latest classification (1964) of the Marsupialia, which does not, however, affect my argument.

The species of mites may now themselves be reviewed. Four have been described from bandicoots (Peramelidae). These form a compact group, and all were originally assigned to *Trichosurolaelaps* Womersley (1956). The first was *T. emanuelae* Domrow (1958) from *Echymipera kalubu* in New Guinea, which was recognized on first examination as being a little atypical and was accordingly keyed out first, leaving the two species from phalangerids to a later couplet. It has since been recorded from N.G. bandicoots, including the type host on many occasions, by Domrow (1961) and Mitchell and Strandtmann (1964). The latter authors also described a further three species of

* To consider laelapid mites outside the scope of this paper, additional support for this choice is found in the host relationships of the *marsupialis* species-group, genus *Haemolaelaps* (see Womersley, 1958; Domrow, 1961, 1963). Of the four species whose hosts are known, two parasitize rat-kangaroos (Potoroinae, Phalangeroidea) and two bandicoots (Perameloidea).

I hasten, however, to add that there is also an argument for the former choice. Of the six species of *Mesolaelaps* Hirst, four are confined to peramelids and one is host-specific for dasyurids (the sixth includes both peramelids and dasyurids, but apparently not phalangeroids, amongst its numerous hosts). See Domrow (1958, 1962, 1963) and Wilson and Strandtmann (1963).

The wheel comes full circle when one considers the *ulysses* species-group, genus *Haemolaelaps* (see Domrow, 1964). Of the four species, one is confined to dasyurids, while the remaining three (including the new species described below from *Petaurus breviceps*) are parasites of phalangerids!

With many mite species undoubtedly still to be discovered when the rarer Australian mammals are examined for ectoparasites, this is clearly an approach which may prove profitable in future studies of marsupial phylogeny.

TABLE I
Comparative anatomy of species of Trichosuroelaps and Australolaelaps

Taxonomic character	Genus <i>Trichosuroelaps</i>					Genus <i>Australolaelaps</i>				
	<i>emanuelae</i> species-group		<i>crassipes</i> species-group			<i>crassipes</i> species-group		<i>crassipes</i> species-group		
	<i>domorovi whartoni</i>	<i>bakeri</i>	<i>crassipes striata</i>	<i>harrisoni</i>	<i>validipes greeni mitchelli</i>					
Setal pairs on shield ¹ ♀/♂	38/36	38/38	38/36	36/36	33/33	31/31	32/32	30/32	33/33	35/33
Anterolateral shield setae	+	+	+	(+)	—	—	—	—	—	—
Gland under shield	+	+	—	—	+	+	+	—	—	—
Shield longitudinally striate ♂	—	—	—	—	—	—	—	—	—	—
Postrolateral shield setae	—	—	—	—	—	—	—	—	—	—
Peritremes ² ♀/♂	1 ₁ /1 ₁	1 ₁ /1 ₁	1 ₁ /1 ₁	1 ₁ /1 ₁	1 ₁ /S	1 ₁ /S	1 ₁ /S	S/S	S/S	O/O
Usurped ventral setae ♀/♂	2/4	2/4	2/4 ⁸	2/4	0/3	0/3	0/3	1/3	2/3	3/3
Holoventral shield ⁴ ♂	E	E	E	E	N	N	N	A	A	N
Anal shield ⁵ ♀	B	B	B	B	L	N	N	L	L	L
Metapodal shields ⁶ ♀	+	+	+	+	—	—	—	—	—	—
Tritosternal spines ⁷ ♀/♂	1/-	1/-	1/-	1/-	2/2	2/2	2/2	0/0	0/0	0/0
Anterodorsal coxal process ♀/♂	+/+	+/+	+/+	+/+	+/+	+/+	+/+	-/+	-/+	+/+
Anterior coxal seta ♀/♂	+/+	+/+	+/+	+/+	+/+	+/+	+/+	-/+	-/+	+/+
Coxal hook ♀/♂	-/-	-/-	-/-	-/-	-/-	-/-	-/-	+/+	+/+	+/+
Enlarged femoral seta ♂	—	—	—	—	—	—	—	—	—	—
Distal tarsal spur ♂	—	—	—	—	—	—	—	—	—	—
Host (Marsupialia Syndactyla)	Pera-melidae	Pera-melidae	Pera-melidae	Pera-melidae	Phalang-eridae	Phalang-eridae ⁹	Hypsiprymno-dontinae	Poto-roinae	Poto-roinae	Macro-podinae

1. The dorsal shield of the females, particularly in *Australolaelaps*, tends to be ill-defined, the marginal setae seemingly not borne on the shield at all. In freshly mounted material, however, these setae are seen to be set in the weakly sclerotized and textureless marginal strip of the shield and not in the adjacent striate cuticle. This effect is figured for *A. mitchelli* by Womensley (1956), and ten pairs of setae shown near the edge of the dorsal shield of *A. validipes* by Domrow (1955) actually belong to the shield series (the minute subterminal pair were also omitted in the original figure of the male of this species).

2. The sternal shield is large and well-defined in all species of *Trichosuroelaps*, but this shield, while extensive, is weakly defined, sometimes extremely so, in *Australolaelaps*.

3. L = Long, S = Short, and O = Obsolete.

4. E = Expanded and N = Not expanded behind coxae IV; A = Anal shield discrete. I am grateful to the Director, S.A. Museum, Adelaide, for the loan of the allotype ♂ of *A. mitchelli*.

5. B = of Broad, L = of Long, and N = of Normal proportions.

6. Always distinct in the *emanuelae* species-group, and represented, at the most, by the merest indications in the other species.

7. Indications of a spine are evident in the males of one or two species of the *emanuelae* species-group.

8. Mitchell and Strandmann (1964) figure five pairs, but the posteriormost pair is actually off the shield in the paratype in this Institute, confirming their statement in the text that four pairs are present.

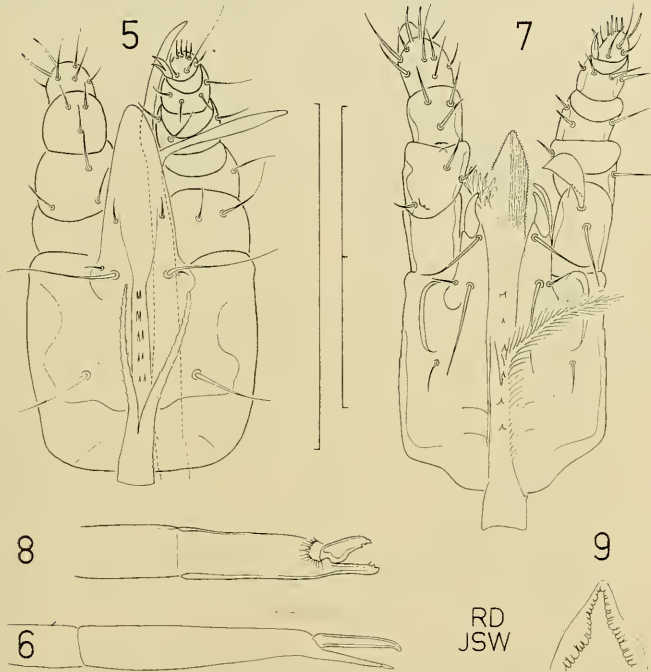
9. Correlated differences also occur on other leg segments. Duplex setae are occasionally present, in either sex, in the *emanuelae* species-group. Pulvilli I are reduced and sessile in the males of the *crassipes* species-group. Setigerous spurs are present on femora I and II of the females, and, to a lesser extent, the males of *Australolaelaps* (indications of these may also be present in the *crassipes* species-group, but they are quite absent in the *emanuelae* species-group). A slight dorsal prominence is present on the dorsal aspect of femur IV in the females of both species from potoroines.

10. At least two of the three hosts involved also harbour *Haemolaelaps ulyssees* Domrow (see Domrow, 1961, 1964).

11. In view of the extreme reduction of the peritremes and the more advanced host of this species, it is possibly better to consider the coxal hook as regressed rather than incipient. It is present in both sexes to the extent that, while it has eliminated the anterior seta, it does not hinder the development of the anterodorsal process.

Trichosurolaelaps from New Guinea as follows: *T. domrowi* and *T. whartoni*, both from *Peroryctes raffrayanus* (I am grateful to Dr. N. Wilson, B. P. Bishop Museum, Honolulu, for confirming that the host of the former species, originally listed as from a "marsupial skunk", was, in fact, a peramelid), and *T. bakeri* from a "bandicoot". No related species are yet known from the Australian mainland peramelid fauna which, apart from a single specimen of *Echymipera* (Tate, 1952), is not known to include the recorded host genera of *Trichosurolaelaps*.

The two closely related species from phalangerids mentioned in the previous paragraph are *T. crassipes* Womersley (1956), the type species, from *Trichosurus vulpecula* (Phalangerinae) in eastern Australia and also in New Zealand, where this possum has been introduced (Domrow, 1961; Mitchell and Strandtmann,



Figs 5-6. *Australolaelaps greeni*, n. sp.—5, Gnathosoma ♀ (ventral, with left palp dorsal); 6, Chelicera ♂.

Figs 7-9. *Haemolaelaps calypso*, n. sp.—7, Gnathosoma ♀ (ventral, with left palp dorsal); 8, Chelicera ♀; 9, Tectum ♀.

1964); and *T. striata* Domrow (1958) which was described from *Pseudocheirus laniginosus* (Phascolarctinae) in Queensland and subsequently recorded (Domrow, 1961, 1964) from *P. convolutor*, a species confined to Tasmania, and another phascolarctine, *Schoinobates volans*, in eastern Australia. Mitchell and Strandtmann (1964) note the occurrence of a species of *Trichosurolaelaps* on *Petaurus breviceps* (Phalangerinae) in New Guinea, but do not describe it for lack of material (this is *not* the species of *Haemolaelaps* described below).

Four species have been taken from macropodids. *Trichosurolaelaps harrisoni* Domrow (1961, 1962) (the use of the specific name *quadratus* in the second last line of p. 80 in the original description is a slip for which I apologize; it should read *harrisoni*, the name upon which I finally decided), was described from the musk rat-kangaroo, *Hypsignymnodon moschatus*, which is restricted to north Queensland. As noted above, it clearly belongs with the parasites of phalangerids.

Two species are known from potoroine hosts (rat-kangaroos). *Australolaelaps validipes* was described from *Potorous tridactylus* in Queensland by Domrow (1955) who subsequently (1958, 1963) extended its range, on the same host, to New South Wales and Tasmania. A new species, extremely closely related to *A. validipes*, is described above from the peculiarly Tasmanian *Bettongia cuniculus*.

Womersley (1956) described *Australolaelaps mitchelli* from a small wallaby (*Protemnodon eugenii*, Macropodinae) in South Australia, and this species has since been recorded in Queensland from the larger *P. dorsalis*, and also from a pademelon, *Thylogale stigmatica*, another macropodine (Domrow, 1961, 1962). In addition to sharing several other characters, particularly on leg II of the male, *A. mitchelli* also shows the gross coxal modifications of the two parasites of potoroines in intermediate form. The three species are, I believe, congeneric.

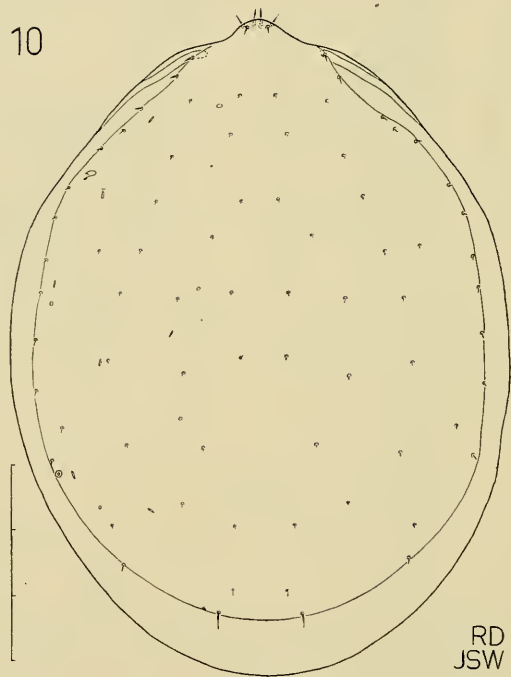


Fig. 10. *Haemolaelaps calypso*. n. sp.—Dorsum ♀.

The comparative external anatomy of these mites is set out in Table 1, which gives the characters of the dorsum, venter and leg II. The vertical division of the table into three sections is that indicated by morphological characters, and it will quickly be seen that this division is nicely correlated with host preferences.

I therefore accept both *Trichosurolaelaps* (with two species-groups, one from peramelids and one from phalangerids and *Hypsiprymnodon*, with *T. emanuelae* and *T. crassipes*, respectively, as *chefs de file*), and *Australolaelaps* (comprising the parasites of the remaining two macropodine subfamilies), as valid genera, distinct, as discussed above, from *Echinonyssus* (= *Hirstionyssus*).

Incidentally, this solution, natural on both morphological and ecological grounds, is also the one that does least violence—only one new combination is necessary—to the presently accepted classification, not that this is, in itself, a valid argument for the system I accept.

HAEMOLAEELAPS CALYPSO, n. sp.

(Figs 7-11)

Diagnosis: In my key (1964) to the *ulysses* species-group, genus *Haemolaelaps*, *H. calypso*, a large species from a phalangerid showing the anterior seta on coxae II and III expanded and hyaline, and the anal shield only slightly wider than long, is nearest *H. ulysses* Domrow (1961). The two species are, however, abundantly distinct, *H. calypso* showing decidedly shorter setae on the dorsal shield, decidedly longer sternal and genital setae, a narrower genito-ventral shield and the differences in leg armature detailed in the description below.

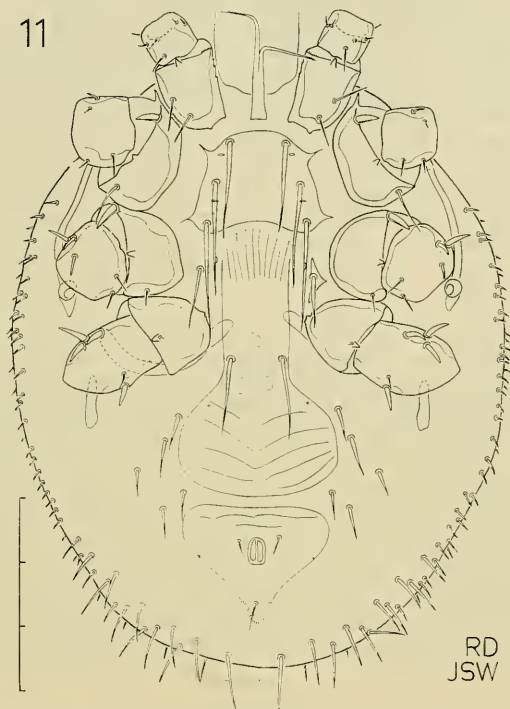


Fig. 11. *Haemolaelaps calypso*, n. sp.—Venter ♀.

Types: Holotype female and six paratype females from the sugar glider, *Petaurus breviceps* Waterhouse (Phalangerinae, Phalangeridae, Marsupialia). Bearii, north of Strathmerton, Vic., 20.vii.1964, R. M. Warneke leg. The holotype and one paratype have been lodged in the Australian National Insect Collection.

Female: Idiosoma a rounded oval, length within circumscribed limits 968-1012, av. 990 μ in six specimens, seventh slightly smaller, 935 μ . Dorsum, apart from narrow marginal strip, entirely covered by single, rounded dorsal shield. Shield textureless except for few weak humeral striae; bearing system of paired pores and 39 pairs of setae, which are extremely weak, except those at vertex, humeri and extreme posterior.

Sternal shield slightly wider than long, textureless. Anterior margin convex, posterior margin concave. Sternal setae strong, reaching well beyond insertions of subsequent pair. Two pairs of small transverse pores on shield. Metasternal shields weak, each bearing metasternal seta half as strong as sternal; flanked internally by longitudinal pore. Genital shield only very slightly wider than anal shield; operculum rayed; traces of muscle insertions

present between two strong genital setae; disc with chevron-like striae and two pores. Anal shield slightly wider than long, with one or two irregular striae anteriorly and two pores laterally. Anus centrally placed, with small adanal setae set near its anterior margin; postanal seta slightly stronger, set immediately in front of distinct cribrum. Metapodal shields distinct, longitudinal and textureless. Peritremes extending forward almost to level of anterior margin of coxae I; peritremal shields small, not extended posteriorly to fuse with exopodal shields IV. Ventral cuticle with five pairs of setae flanking shields; margins with about 52 pairs of stiff setae.

Leg setation as follows: coxae 2.2.2.1; trochanters 6.5.5.5; femora 13.11.6.6; genua 13.11.9.9; tibiae 13.10.8.10; tarsi -.16.16.16 (excluding two terminal filaments). This compares exactly with the typical formulae given by Till (1963) for *Androlaelaps* Berlese *s.l.* (including *Haemolaelaps*), except that one seta less is present on genu IV (on checking all the species of the complex, the same is found to be true of *H. ulysses*, both in the holotype and an extensive series from *Schoinobates volans*, while *H. penelope* and *H. telemachus* are typical). Anterior seta on coxae II and III expanded and hyaline; seta on coxa IV minute. Trochanters III and IV with three and four expanded hyaline setae respectively (against none in *H. ulysses*). Apically bifurcate setae present on femora only, formula 2.2.1.1. Remaining leg setation undistinguished. Ambulacra I only half as strong as II-IV, all with two claws.

Gnathosomal and outer posterior hypostomal setae subequal, considerably weaker than anterior and inner posterior hypostomals. Gnathobase with longitudinal hyaline flange anterolaterally; deutosternum with about five denticles, mostly in single file. Tritosternum with laciniae strongly bipectinate. Labial cornicles quite well developed; hypostomal processes, salivary stylets and epipharynx as figured. Tectum triangular, with marginal strip smooth and diaphanous, merging *via* dendritic line into denser central area as in other species of the complex. Chelicerae with movable digit bidentate; fixed digit unidentate, with small pilus dentilis. Corona present. Palpal setal formula as detailed by Till (1963) for *Androlaelaps*, i.e. 2.5.6.14 (trochanter to tibia, including two dorsodistal tibial rods). One trochanteral seta hyaline and strongly foliate, obscuring small triangular outgrowth on ventrodistal margin of segment. Tarsus with few setae and rods in addition to bifid claw.

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Corrigendum

These PROCEEDINGS, vol. 89, part 1, page 161, line 11, for first "IV" read "III".